

# Body representation, eating attitudes and BMI in adolescence

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## ABSTRACT

This research aims to investigate, in a population of adolescents, the body's representations, the representations of the relationship with food, the characteristics of dietary habits, body image perceived body image as real as possible predictors of behavior disorders food in the same age group. We recruited 100 children (mean age 16.3 sd = 1.51), by the school to which they belong. We 'measured the BMI (Body Mass Index), the semantic differential on the body representation, one on food relationship and test EAT. This study showed that the representation of the body is extremely sensitive in the adolescent population, the figure body itself in relation to BMI and not eating habits. This result implies that adolescent prevention should be focused on the representation on that body rather than eating habits.

**Key words:** self-image, B.M.I., body perception.

## Introduction

Body schema is the representation of the spatial characteristics of the body that individuals derive from the information they get from the sense organs. In literature, the definition generally accepted is the one provided by Head and Holmes (1911, 1929). In their work they state that body schema is the representation the body obtains by comparing and integrating past sensory (postural, tactile, visual, kinesthetic and vestibular) experiences with current sensations at the cortical level (1). The definition of body schema proposed by Head and Holmes has given rise to more complex concepts that reflect the complex articulation of the very structure of body schema, that is, the result of the process of spatial localization performed by the nervous system. Body schema would be formed mainly in the primary and secondary areas of the sensory cortex, particularly in the parietal lobes. With *body image* we refer to the manner in which the subject experiences and views his body. Although Head's model is still valid, it does not encompass the totality of body representations. A body schema is in fact a complex perceptual schema, linked to the process of spatial localization performed by the nervous system. However, the subjective components of cognitive-affective representations of the body came to be analyzed only more than twenty years since the formulation of the concept of body image. A very significant contribution is provided by Paul Schilder (2), who, even if drawing on previous studies for the idea of body image, is aware of the limitations of a body representation reduced to a sum total of sense perceptions. New theoretical developments have been achieved with the increase in research on eating behavior. These studies have analyzed the features of the body trying to clarify the elements that compose it. According to some scholars, such as Lackner (3), we can identify a first difference between *short-term body image* and *long-term body image*. The *short-term body image* differs from body image because it is a conscious image of the position of the various parts of the body at a given time, the particular posture a person is experiencing. The *long-term body image* is an overall image of the body that describes the way in which the subject is structured. If these two images did not interact the subject would not be able to understand how he can switch from the present posture to a new image. We find a further difference between the concept of cognitive and af-

fective perception of the body, between mental attitude and satisfaction with one's body. Garner and Garfinkel (4) distinguish between two internal components of body image: the first, called 'body image Affect', includes all the feelings and emotions aroused by conscious thoughts in relation to one's body; therefore it is the affective component of body image. The second component, called '*body image attitude*', is made up of all the ideas and rules that organize the way we see our body. Slade (5) provides a similar distinction in suggesting that, within the body image, it is possible to differentiate between a cognitive component, related to the accuracy in evaluating the body size, and an emotional component related to the body or parts of it (*body dissatisfaction* or *body shape disparage*). According to this vision, the core of the body image is composed of interrelated cognitive and affective elements: the cognitive components include ideas about body size and physical appearance and influence the emotional components. These latter, in turn, according to the effects of physical appearance in daily life and in social relations, feed back on the cognitive components. One of the major problems inherent in the concepts of body schema and body image is the absence of a unified theory that may explain the modes of relation, although numerous studies have shown the presence of a strong link between the two concepts.

The brain, in order to store the information coming from the outside world, transforms the stimuli in cognitive representations (Anderson, 1980) (6). These representations can be separated into two categories: perceptual-motor and symbolic-reconstructive representations. *Perceptual images* – or *perception-based knowledge representations*, constitute the simplest form of cognitive representation. As perceptual images can represent a diversified set of information, a stimulus can be identified even when it occurs in an unusual manner. At a higher level of complexity we find *propositional units* – *meaning based knowledge representations*, which are created by abstracting conceptual information from the perceptual elements. Propositional units, which can be considered as the simplest form of knowledge, contain the amount of information required for the elaboration of a true-or-false kind of judgment on them. The representations of words, experiences, events in memory, consist of a hierarchically organized network of these units. At the highest level of representation we find the "schemata" or "contexts", complex sets of information that form general concepts. Schemata en-

able the occurrence of inferences and contain the information needed to manage the specificity that characterizes new situations. This type of representations determines not only the type of information that will be remembered, but also which part of the information remembered is most relevant. These three levels of representations intervene decisively in the formation of conscious experience, but in most situations, they act without the subject's awareness (Schlundt e Johnson, 1990) (7). Some research has examined body representations as predictors of eating disorders, such as the studies conducted by Karen Saules et al., (8) who analyzed the relationship between body representations and eating attitudes. Their results show that, among participants who were not overweight, 43.2% of those who believed they were overweight admitted to binge eating behaviors, while only 32.9% of those who did not feel as overweight maintained the same behavior. The perception of weight problems (Weight Problem Perception, WPP), mediates the contribution of the BMI (Body Mass Index) on the outcomes of eating behaviors of binge eating. The results of this study suggest that in investigating the presence of dietary habits/behaviors at risk of binge eating we need to take into consideration also the subject's representations of his own body. Self-representation of individuals as fat or overweight has a significant predictive power. There are a number of conclusions in the literature on the importance of the "fat self-schema, or an individual's self-schema as overweight, in cases of eating disorders. These results show the importance of one's identity, of the representation an individual has built of himself, in maintaining an addictive behavior such as binge eating. (K. Stein, C. Court, 2007) (9). Another study conducted by Cecile C. Exterkate et al (2009) (10) undertakes the investigation of the role of body representations in influencing certain eating behaviors. The research focuses on body representations in patients with eating disorders before and after 5 months of intensive daily treatment. The study involved a sample of 193 patients with anorexia nervosa (AN), Bulimia Nervosa (BN) or eating disorders not otherwise specified (Eating Disorder Not Otherwise Specified, EDNOS) diagnosed by means of Body Attitude Test, Body Mass Index, Eating Disorder Evaluation Scale and Symptom Checklist 90. The different types of disorder differed in BMI, general attitude towards one's body and negative judgment of one's size, but this did not happen at the end of treatment. Following treatment, all

groups of patients reported significant reduction of symptoms and all, except the group of patients diagnosed with Restrictive Anorexia Nervosa (AN-R), showed an improvement in the complexity of psychological functions. However, patients with AN, AN-R and AN-P (Anorexia Nervosa-Purging) showed differences in changes in attitudes toward their body. Patients with AN-R did not show significant improvements in their attitudes, while patients with AN-P improved their general attitudes. Patients with non-Purging Bulimia Nervosa (BN-NP), Purging Bulimia Nervosa (BN-P) and those with EDNOS showed similar improvements in TBA (Total Body Attitude) scale scores. Attitudes towards the body, or representations of the body, provide important clues for the differentiation between the various eating disorders and their most appropriate treatment. Another research carried out by Eggert J. et al., (11) investigated as attachment and some personality traits may influence the onset of harmful eating behaviors.

The study by Giorgio Tasca et al., examines the role of emotional regulation strategies in mediating the relationship between attachment and eating disorders (12). According to this research, an anxious attachment style contributes to depression and eating disorders through a reactive affect regulation strategy. Another study, conducted by J. Doeschka et al., (13) studied the relationship between the mother's concern for her weight and her maternal encouragement to be thin as perceived by the child. Moreover, the study also addressed the issue of body dissatisfaction in young children. Therefore, the relation between children's perception of maternal encouragement to be thin and body dissatisfaction was well founded. There were no gender differences, but the relation was stronger in older children. The conclusions drawn by this study highlight the vulnerability of school children in to maternal influences. There seems to be some consensus among family therapists on the fact that intrusiveness, excessive care and overprotection are present in anorexic families (Minuchin, 1978) (17), although these predictive factors have not been clearly confirmed by any previous study: only one study, among the number of research and studies, showed that parental control carries an important weight to the development of anorexia nervosa (Steiger et al., 1989) (18), while another study showed the same phenomenon due to maternal control (Gomez, 1984) (19). The study by Bulik et al., (2000) (20) examined a population of very serious chronic anorexic girls. Within the clinical

group participating in this study, the care of grandmothers (both maternal and paternal) was associated with the grandchildren's severity of symptoms of anorexia nervosa. These results underscore the central role played by the dimension of care of family relations in eating disorders, since it may have an impact on eating behaviors, both directly and indirectly, through intergenerational transmission. In accordance with these theories, the present research aims to investigate, in a population of adolescents, bodily representations and representations of relationship with food, characteristics of eating habits, possible correlations between dietary habits and body image, perceived body image and real body image, looking for possible predictors of eating disorders in the same age group.

## 1. Method

Subjects: 100 adolescents aged between 14 and 19 years (mean age 16.3 sd = 1.51), of which 64 female and 36 males. Subjects were recruited, on a voluntary basis and free of charge, through the school they attended and took part in the research after reading and signing informed consent. In the case of minors, consent was signed by the subjects' parents. The questionnaires of subjects with personal histories of nutrition and/or metabolism diseases were excluded from data analysis. All data were collected anonymously and treated in accordance with the current privacy law: Decree Law No. 196/03 (Art. 7 and 13) "Personal data protection code."

## 2. Instruments

- This research used the following instruments in printed form:
- Questionnaire on dietary habits
- Semantic differential for the "relationship with the body";
- semantic differential for "food";
- Test on eating behavior "EAT-26" (21);
- Following auxological data: date of birth, height, weight, age at menarche (if female), personal history of nutrition or metabolism

diseases. A portable standiometer “Leicester Height Measure” was used for height measurement. The weight was measured by means of two portable scales, “Tefal” and “Secular”. The BMI (Body Mass Index) was determined with the use of the BMI formula:  $BMI = \text{weight (kg)} / \text{height (m)}^2$ .

### 3. Procedure

Whereas the compilation of questionnaires and the collection of anthropometric measurements took place within the classrooms of the institution of the subjects, the collection of weight and height data was performed in a larger secluded room so that the subjects could feel more at ease. While administering the questionnaires, an operator explained orally when the papers had to be handed in, even if the questionnaires contained the explanation. Two or more operators remained in the classroom to ensure a proper performance of the task and to answer possible questions from the kids, while, in the larger room, four operators registered weight and height measurements; two were placed near the scales, another one near the stadiometer, and the last one attended to each child’s compilation of the auxological forms, providing explanations for any term the subject should not understand. The whole procedure of filling in questionnaires and surveying anthropometric measurements took about one hour, with 20–30 kids at a time. For height measurement the kids had their shoes off, their heels, buttocks, shoulders and back of the head against the measuring rod, and their head upright so as to form an ideal tangent plane to the jaw and parallel to the footplate. The sliding headpiece exerted pressure on the head to flatten the subject’s hair, which was left loose so that it could not prevent proper detection of height.

Heels and ankles were kept together with toes slightly apart and legs straight. As for the measurement of weight, in order to perform it adequately, the weight should be equally distributed on both feet, whose soles should rested on a stable and flat base.

## 4. Data analysis

Descriptive analysis: mean and standard deviation of age, BMI values, low, normal and high BMI frequency and EAT. We conducted a factorial analysis of the semantic differential 'relationship with the body' and 'relationship with food', with the choice of extrapolation of two factors. Then we analyzed a regression on the values of the factor analyses of 'relation with my body' and of the 'relation with food' as independent variables, and BMI and eat as dependent variable.

## 5. Results

The sample consisted of 100 subjects, mean age 16.3 years ( $sd = 1.5$ ), 64% female and 36% male. From factorial analysis we drew out two factors representing the semantic differential "relationship with my body" and "relationship with food." In the factorial analysis "The relationship with the body", for factor 1 we found higher negative eigenvalues for the variables ( $-0.98$ ): good / bad, beautiful / ugly, active / passive, small / large, rough / smooth, cold / hot, clear / confused, angular / round, tense / relaxed, quiet / noisy; near / far; variable / constant. For factor 2 we found higher positive eigenvalues for the variable, predictable / unpredictable ( $0.31$ ); vague / precise ( $0.47$ ), empty / full ( $0.49$ ), small / large ( $0.71$ ). In analyzing the "relationship with food" there was a slightly negative correlation for the variable sex ( $-0.64$ ) and a significantly negative correlation for all other variables ( $-0.99$ ) except for unclear / confused and silent / noisy in which no correlation was apparent.

For factor 2 there was only a negative correlation for the item clear / confused ( $-0.65$ ).

In the regression instead, for the variable 'relationship with my body' ( $F=5,02$ ,  $p=,009$ ) was a factor of significance and in the coefficient we found Factor 2 ( $t=3,16$ ,  $p=,002$ ) significant. Factor 1 was not significant.

In analyzing 'relationship with food' and BMI and eat we found no significant values.



## 6. Results, Discussion and Conclusion

Based on the result of our research, body representation, measured by an instrument that assesses the scores of representation through a space of subjective attribution, is extremely sensitive, at least in adolescents, to the actual body shape. The semantic differential of 'relationship with the body' indicates that individuals evaluate their body as a whole on various items, corresponding to the same dimension that we could represent as the dimension related to the characteristics of body activation (e.g., Active / passive, noisy / quiet) and a second dimension related to the physical body dimension (e.g., small / large, empty / full, etc.).

These two factors are inversely proportional: the more the body is perceived as small the more it is perceived as active; the more the body is perceived as big and plump the less it is perceived as active. From a comparison with the 'relationship with food', we can see two factors emerging also in this case: the first includes the level of activation related to body size, the second is better explained by the variable 'light / confused'; in this case we can say that a body perceived as small and active and is correlated with a good relationship with food (item 'clear') while a body perceived as big and 'bad' has an ambivalent relationship with food (item 'confused'). The representation of the body measured with the differential is extremely sensitive, in the adolescent population, to the body shape itself in relation to BMI rather than to eating habits.

This is probably due to the fact that adolescents are still living in familiar contexts, so their eating habits do not reflect a choice related to the perception of self, but rather are decided and established by the family context. We do not find differences with respect to either sex. The samples of males and females are not significantly different compared with body representation scores. This is probably due to the fact that there is a tendency, in males, to have higher BMI scores and therefore the representation of the semantic differential factors. In fact males, when compared with females, tend to represent themselves as 'plumper', 'larger', 'stiffer' and 'stronger', while the females as 'smaller', 'weaker', more 'unpredictable'. From a comparison between EAT values, there are no differences between males and females, even if there is a tendency for females to have higher scores than males. The EAT score is correlated to the score differential of 'empty / full' on the "relationship with food", but not on the relationship with the body. From this study, carried out on a non-patholog-

ical student population, it is clear that even in normal situations, we can read some related indicators connected mainly to BMI rather than to gender differences. In particular we can see how the relationship with one's body is affected by BMI, while the relationship with food does not suffer from any influence by the variables analyzed. Ultimately, the only factor to influence the eating habits of adolescents is the conception of their BMI, rather than their actual eating habits acquired within the family. This is because, since the subjects live in a family, their habits are determined by parental conditioning and by the context in which they live.

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